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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,076	12/11/2003	Wade Lee Bowles	71743 CCD	1287

7590

08/18/2004

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EXAMINER

LIN, ING HOUR

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 08/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/735,076

Applicant(s)

BOWLES ET AL.

Examiner

Ing-Hour Lin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2003.  
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-35 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0812.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
3. Claims 1-4, 7, 9-10, 13, 15-22 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al.

WO '352 (page 2, lines 1+) teaches the claimed mold and method for horizontally casting a molten metal, comprising a mold 3, including inlet end 4 and openings 25, 26 provided by a refractory transition plate 19 in a (connecting ring) 5, a preferably circular cavity 17 with an annular outwardly tapered shoulder and a wall 12, 13 or permeable material for supplying oil and gas from a second and a third conduits (separate channels) 10, 11, annuli 20, arranged between the permeable wall material and the mold housing 8, and divided into sections; and cooling slit or nozzles 16 arranged along the circumference of the cavity for direct supply of coolant.

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WO '352 fails to teach the use of a first gas conduit positioned at the corner of the shoulder and cavity wall.

However, Yanagimoto et al (col. 4, lines 66+) teach the claimed first gas conduit 25a at the corner of the shoulder and cavity wall for the purpose of feeding gas into the mold and generating a metal free pocket (space) 26. The gas in this space 26 applies pressure to the molten metal, the contact point of which metal with the mold 21 is then displaced to a downstream position. The gas contains reactive oxygen of 1-15% by volume and other part of argon. It would have been obvious to one having ordinary skill in the art to provide WO '352 the use of a first gas conduit positioned at the corner of the shoulder and cavity wall as taught by Yanagimoto et al in order to effectively cast metal having protective oxide film without sticking the mold surfaces.

4. Claims 5-6 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view of Thoenton.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of impermeable barrier.

However, Thoenton (col. 3, lines 13+) teaches the claimed impermeable barrier 23 formed from a flexible graphite material for the purpose of preventing oxide formed the casting wall and directing gas moving towards the bores 27. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of impermeable barrier as taught by Thoenton in order to effectively of direct gas or lubricant oil and prevent oxide formed the casting wall.

5. Claims 8 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view of Kudo et al and McGee et al.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of detectors to measure the electric resistance variation between the mold cavity wall and molten metal.

However, Kubo et al (col. 2, lines 66+) teach the use of detectors (sensor) S for the purpose of directly measuring the variation of resistance and detecting gas oil (col. 2, lines 8). McGee et al teach the use of detectors (sensor) 224 having electrodes 214 216 for the purpose of measuring the variation of resistance corresponding to the metal content in the lubricant oil. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of detectors (sensor) S and electrodes as taught by Kudo et al and McGee et al in order to effectively measure the electric resistance variation between the mold cavity wall and molten metal present in the mold during casting.

6. Claims 11 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view Ohno.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of non-circular inlet opening for the mold.

However, Ohno (col. 2, lines 23+) teaches the use of non-circular inlet opening such as U or C in cross-section for the mold for the purpose of producing an ingot without defects but having a circular cross-section. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of non-circular inlet opening for the mold as taught by Ohno in order to effectively produce an ingot without defects but having a circular cross-section.

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7. Claims 12 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view Kittilsen et al.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of asymmetrically arranging the inlet opening to the mold.

However, Kittilsen et al (col. 3, lines 39+) teach the use of asymmetrically arranging the inlet opening to the mold for the purpose of avoiding heat convection to the top surface of the ingot such that the sump exists with its deepest point in the center of the ingot. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of asymmetrically arranging the inlet opening to mold as taught by Kittilsen et al in order to of effectively avoid heat convection to the top surface of the ingot such that the sump exists with its deepest point in the center of the ingot.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view of Foye et al.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of controlling the coolant discharge openings around the mold.

However, Foye et al (col. 2, lines 26+) teach the use of controlling the coolant discharge openings around the mold for the purpose of and preventing defects on the cast ingot. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of controlling the coolant discharge openings around the mold as taught by Foye et al in order to improve surface quality of the cast ingot.

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9. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view of Richards et al.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of lubricant containing a gas.

However, Richards et al (col. 2, lines 35+) teach the use of lubricant containing a gas for the purpose of providing gaseous oxidation inhibiting agent. It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of lubricant containing a gas as taught by Richards et al in order to provide gaseous oxidation inhibiting agent on the mold wall and interact with the gas in the pocket and regulate the oxygen content in the pocket so that the appropriate oxide formation on the ingot can be controlled.

10. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/00352 in view of Yanagimoto et al and further in view of Flowers et al.

WO 01/00352 in view of Yanagimoto et al fails to teach the use of controlling cooling rate.

However, Flowers et al (col. 7, lines 4+) teach the use of controlling cooling rate with a value higher than 100 °C/sec for the purpose of producing fine grain structure with small dendritic arm spacing for the ingot (col. 8, lines 65+). It would have been obvious to one having ordinary skill in the art to provide WO '352 in view of Yanagimoto et al the use of controlling cooling rate as taught by Flowers in order to yield fine grain structure with small dendritic arm spacing for the ingot.

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11. Claims 34-35 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Flowers et al.

Flowers et al (col. 1, lines 32+) teach the continuous casting aluminum alloy in the application of disk “fly” within a micron or less of rotating disk surface and minimum micro roughness through the control of cooling rate and yielding fine grain structure with smaller than 1 micron dendritic arm spacing (col. 8, lines 65+) in order to satisfy the application of a disk “fly” within a micron or less of rotating disk surface.

Flowers et al do not teach the use of a roughness of less than 50 microns over at least 50% of the circumferential area. However, the use of a roughness of less than 50 microns over at least 50% of the circumferential area would have been obvious to one having ordinary skill in the art to provide fine surface of the product for the purpose of producing minimum micro roughness (col. 1, lines 46+) on the substrate with excellent surface quality.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ing-Hour Lin whose telephone number is (571) 272-1180. The examiner can normally be reached on M-F (8:00-5:30) Second Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*l. H. d.*

I.-H. Lin

8-5-04

**KILEY S. STONER**  
**PRIMARY EXAMINER**

*Kiley Stoner* 8/9/04